



City of New Haven, Connecticut

Developing an Air Toxics Inventory & Reduction Strategy for New Haven, CT

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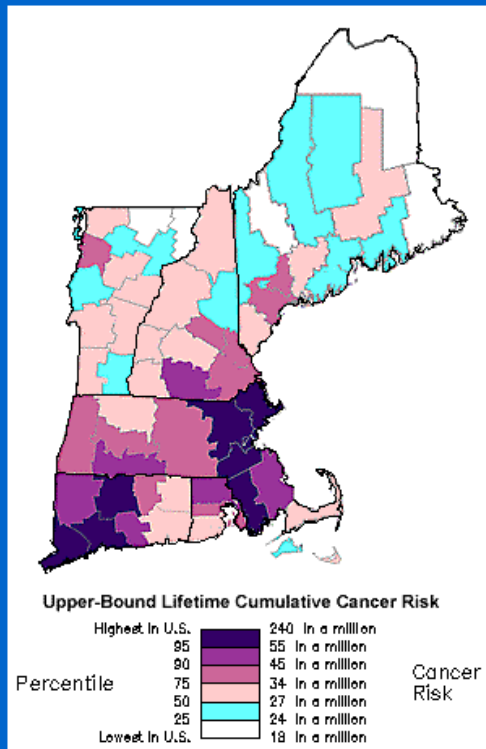
Why Is New Haven

Developing an Inventory of HAP Emissions?

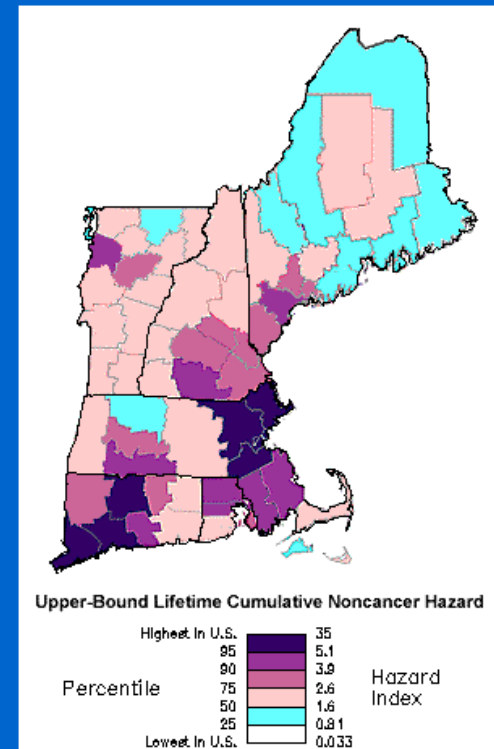


Background

- 1996 NATA data showed that HAP emissions in New Haven County were the second highest in New England



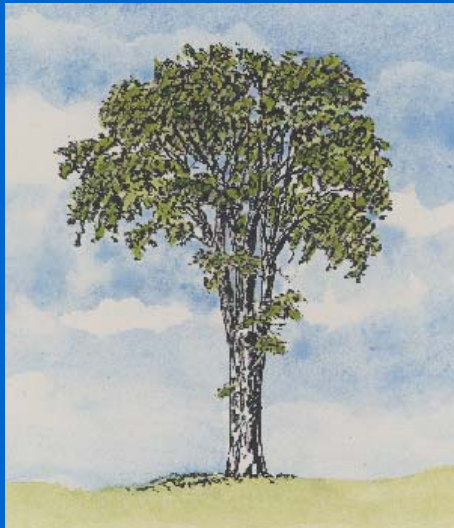
Median Cancer Risk



Median Noncancer Hazard

Other Context

- Completed Greenhouse Gas Inventory August 2001 - Cities for Climate Protection Campaign
- New Comprehensive Plan of Development - to be released Fall 2003



- Emphasizes environmental health & sustainability as components of New Haven's quality of life
- Environmental considerations to provide guidance for urban development policies and regional planning initiatives

Primary Objectives

- What sources are responsible for hazardous air pollutant emissions in New Haven?
- What are the pollutants of concern?
- Where in New Haven might there be concentrations of hazardous air pollutants?



How can this information be used to reduce health risk in New Haven?

Secondary Objectives

- What are the barriers to developing a local-scale HAP inventory?
- What are useful data sources?
- How accurately can national-scale data be apportioned to the local level?
- How accurate are EPA's HAP emission factors when applied to local activity data?

Source Categories

- Point Sources
- Stationary Area Sources
- Mobile Sources
 - On-Road
 - Off-Road



Point Sources



- Stationary sources included in State or Federal inventories
- 40 New Haven sources + 24 within approx. 5 miles of New Haven (Screen 3 Model) - Ansonia, Branford, Derby, East Haven, Milford, North Branford, North Haven, Seymour, West Haven, Woodbridge

Data Sources (point sources)

- 1999 National Emissions Inventory (NEI)
- Toxic Release Inventory (TRI)
- 2000 Connecticut DEP Criteria Pollutant Emission Inventory
- Speciation profiles from:
 - 1999 NEI documentation
 - EPA's *Speciate* software
 - AP-42 (Compilation of Air Pollutant Emission Factors)

Results (point sources)

- 211 TPY HAPS emitted from New Haven facilities
- Additional 222 TPY emitted from facilities in adjacent towns
- Total Point Source HAPS = 433 TPY

Point Source Pollutants (Top 15 - NH Only)

POLLUTANT NAME	EMISSIONS (LBSPY)	EMISSIONS (TPY)
Toluene	102,812.4	51.4
Styrene	65,319.4	32.7
Methyl Ethyl Ketone (2-Butanone)	38,984.3	19.5
Methyl Tert-Butyl Ether	35,226.8	17.6
1,1,1-Trichloroethane (Methyl chloroform)	25,359.3	12.7
Xylenes (Mixed Isomers)	19,573.7	9.8
N-Methyl-2-Pyrrolidone	18,007.0	9.0
Napthalene	14,725.0	7.4
Methylene Chloride (Dichloromethane)	11,001.3	5.5
Hexane	9,442.3	4.7
Methanol	8,770.6	4.4
Formaldehyde	8,152.0	4.10
Benzene	7,881.7	3.9
Copper Compounds	6,569.4	3.3
Ethyl Benzene	5,573.0	2.8

Point Source Pollutants (NH + Adjacent Towns)

POLLUTANT NAME	EMISSIONS (LBSPY)	EMISSIONS (TPY)
Toluene	256,594.7	128.3
Methyl Ethyl Ketone	66,393.9	33.2
Styrene	65,319.4	32.7
Glycol Ethers	43,150.6	21.6
Methyl Chloroform (1,1,1-Trichloroethane)	35,360.1	17.7
MTBE	35,226.8	17.6
Methylene Chloride	32,425.4	16.2
Xylenes (mixed isomers)	25,073.7	12.5
N-Methyl-2-Pyrrolidone	18,007.0	9.0
1,1-Dichloro-1-fluoroethane	17,050.0	8.5
Napthalene	16,106.6	8.1
Methanol	14,281.6	7.1
Methyl Isobutyl Ketone (Hexone)	12,807.5	6.4
Ethyl Acetate	11,500.0	5.8
Hexane	9,449.8	4.7

Point Source Emissions by Category

CATEGORY	HAPS
Surface Coating	224.4 tons
Petroleum Storage & Transport	42.9 tons
Fuel Combustion	10.2 tons
Waste Disposal	1.6 tons
Other Industrial Processes*	116.9 tons

*Includes Metal Products Manufacturing, Chemical Manufacturing, Commercial Sterilization, Degreasing, Etc.

Quality Control Caveats

- Emission summaries sent to facility managers for review
- Responses due Friday
- So far, significant discrepancies reported
- Inventory will be revised accordingly

Area Sources



- Small stationary sources
- Treated collectively because too small, too numerous or too difficult to inventory individually
- Grouped according to source category
- Calculated using activity data and emission factors

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Area Source Category Summaries

Category Name	Total HAP Emissions
Architectural Surface Coating	55.2 tons
Solvent Cleaning	36.2 tons
Residential Wood Burning	24.5 tons
Gasoline Distribution Losses	20.5 tons
Dry Cleaners	17.9 tons
Structure Fires	8.6 tons
Auto Body Refinishing	6.3 tons
Traffic Markings	0.8 tons
Residential Heating	0.5 tons
Consumer Product Usage	150.5 lbs

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Area Source Pollutants

POLLUTANT NAME	EMISSIONS (TONS)
n-Hexane	25.11
1,1,1-Trichloroethane	24.89
Perchloroethylene	19.23
MTBE	9.88
Trichloroethylene	9.02
Toluene	9.99
Methyl Ethyl Ketone	8.52
Hexane	7.38
Isomers of Xylene	7.26
Hydrogen Cyanide	5.49
Ethylbenzene	5.31
Methylene Chloride	4.89
Benzene	3.92
Hydrochloric Acid	2.34
Ethylene Glycol	1.19

Surveys Underway

- Graphic Arts Facilities - EPA's alternative method yielded estimate of 973 TPY HAPS
- Gasoline Service Stations - 50% response rate to date
- Dry Cleaners - 65% response rate to date (including facilities with zero emissions)

Onroad Emissions



- 1999 NEI county-level emissions apportioned to City of New Haven using VMT data

HAPS by Vehicle Category

Vehicle Type	HAPS (lbs)	HAPS (tons)
2B Heavy Duty Diesel	854.7383	0.427369
Buses Heavy Duty Diesel	578.8565	0.289428
Heavy Heavy Duty Diesel	13212.54	6.606272
Medium Heavy Duty Diesel	2808.621	1.404311
Light Heavy Duty Diesel	642.2149	0.321107
Light Duty Diesel	750.3489	0.375174
Heavy Duty Gasoline	33163.77	16.58188
Light Duty Gasoline Vehicles	639245.5	319.6227
Motorcycles	3835.839	1.91792

Onroad Vehicle HAP Emissions

HAP Name	HAPS (lbs)	HAPS (tons)
Toluene	202201.9908	101.101
Xylene (mixed isomers)	116725.0312	58.36252
2,2,4-Trimethylpentane	88975.79995	44.4879
MTBE	76195.66059	38.09783
Benzene	73349.81219	36.67491
Formaldehyde	45679.99142	22.84
Ethyl Benzene	30659.72886	15.32986
Hexane	23112.50489	11.55625
Acetaldehyde	13377.43903	6.68872
1,3-Butadiene	12409.56609	6.204783
Styrene	6186.014294	3.093007
Propionaldehyde	2111.021304	1.055511
Napthalene	2035.76022	1.01788
Acrolein	1919.9717	0.959986

Data and Method Caveats

- Questions regarding the accuracy of the 1999 NEI onroad emissions data for New Haven County
- Method underestimates diesel emissions in New Haven because truck traffic is assumed to be equally distributed throughout the County

Nonroad Vehicles



- Ships, Trains, Planes calculated with activity data and emission factors
- All other nonroad vehicle emissions estimated by apportioning County-level emissions to City of New Haven based on activity data

Planes, Trains, & Ships



- Aircraft Emissions = 3.98 tons
 - LTO data



- Locomotive Emissions = 0.78 tons
 - Fuel consumption data



- Commercial Marine Vessels = 0.3116 tons
 - Waterborne Commerce Statistics

Other Nonroad Vehicles

- Construction Equipment = 36.27 tons
- Commercial Equipment = 17.56 tons
- Household Lawn & Garden = 25.55 tons
- Industrial Equipment = 3.13 tons
- Commercial Landscaping = 15.81 tons
- Golf Course Equipment = 0.51 tons
- Recreational Boats?

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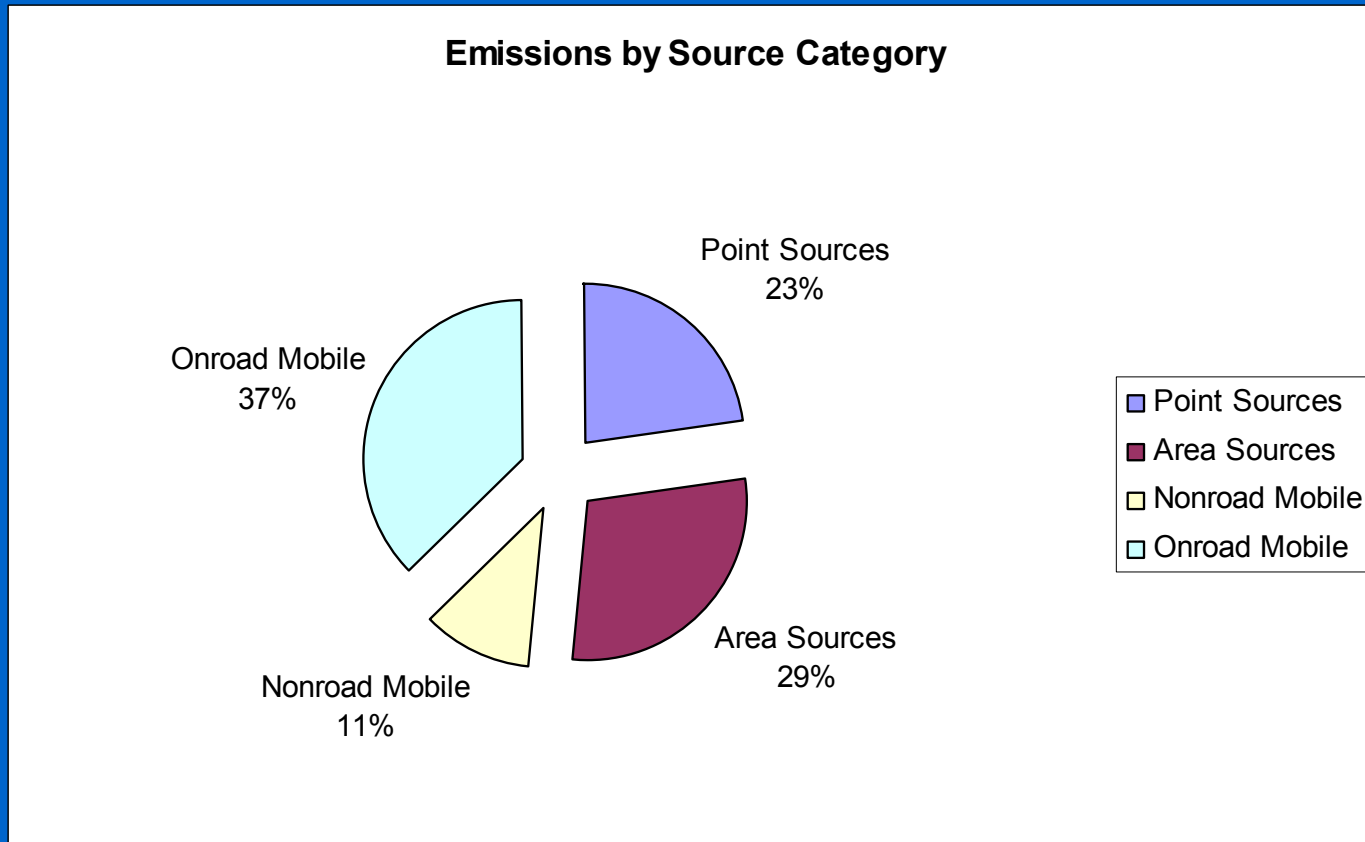
Total HAP Emissions by Source Category

Source Category	HAP Emissions (tons)
Point Sources (New Haven)	210.72 tons
Point Sources (Adjacent Towns)	221.98 tons
Area Sources*	263.945 tons
Nonroad Mobile**	103.00 tons
Onroad Mobile	347.55 tons

*Area Source total does not include graphic arts

** Nonroad total does not include recreational boats

Emissions by Source Category



Pollutant Totals

POLLUTANT NAME	EMISSIONS (TONS)
Toluene	252.044
Xylene (mixed isomers)	91.116
MTBE	65.586
2-Chloro-1,1,1,2-tetrafluoroethane (HCFC124)	56.105
2,2,4-Trimethylpentane	50.056
* Benzene (Including Benzene From Gasoline)	49.626
1,1,1-Trichloroethane (Methyl Chloroform)	48.584
Methyl Ethyl Ketone (2-Butanone)	41.28
* Formaldehyde	40.585
Styrene	36.006
Ethyl Benzene	30.356
n-Hexane	26.348
Hexane	25.846
* Perchloroethylene	23.483
Glycol Ethers	21.575

* Indicates EPA Urban HAP

Next Steps - Achieving Risk Reduction

- Air Toxics Project Focus Group
 - Members include DEP, EPA, New Haven Environmental Justice, PSEG, CFE, NESCAUM, New Haven Festival of Arts & Ideas, New Haven Board of Aldermen, New Haven Board of Health, Common Ground High School, Yale University, Environment Northeast, Representative DeLauro's Office
- EPA Healthy Communities Grant Award
 - Air Toxics Risk Management Project

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Next Steps - Stationary Sources

- Preliminary Risk Assessment
- Screen3 Model inputs stationary source emissions data to calculate ambient concentrations
- Ambient concentrations will be compared with health benchmarks
- EPA assistance

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Stationary Sources (Continued)

- Pollution Prevention & Compliance Workshops
 - Partners: EPA, DEP, NESCAUM
 - Surface Coating Operations
 - Auto Body Shops
 - Printers

Next Steps - Mobile Sources

- Diesel Exhaust Reduction Strategy
 - Partners: DEP, Environment Northeast
 - Ultra Low Sulfur Diesel fuel switching
 - Organize local buying group to speed transition
 - Equipment Retrofits
 - New Haven school bus fleet
 - I-95 construction equipment
 - Diesel working group



Next Steps - Indoor Air Toxins

- Outreach & Education
 - Partners: EPA, New Haven Board of Health, Board of Aldermen, Common Ground High School
 - EPA's Parental In-Home Smoke-Free Pledge
 - Toxic Consumer Product Education
 - Cleaning Materials Procurement Guidelines for New Haven Board of Education

Recognition of Success

- “Best of New Haven” Environmental Award Ceremony
 - Recognition of “greenest” corporate and institutional actors
 - Fuel Switches / Fleet Retrofits
 - Changes in Production Processes
 - Energy Efficiency / Renewable Energy



The End



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